SEARCH SYSTEM AND METHOD VIA PROXY SERVER

This invention relates to a search system and method of searching, particularly but not exclusively to a method of searching which provides personalised responses to search requests generated by an entity. The personalisation may determine the manner in which the search is conducted, the format and mode of delivery of the search results, and the nature of the information provided. The data is searched for and retrieved over a distributed computer system but can be retrieved using other means such as facsimile, electronic mail, and interactive voice recognition technology.

The search system and method use a protocol which enables a user to be associated with a permanent identity which can be mapped to an address (which may be either static or dynamic).

In particularly, but not exclusively, the search system and method uses a permanent identity such as a Session Initiation Protocol (SIP) User Resource Identifier (URI), to retrieve data from a distributed computer system to enable a search result to be sent to the user even if the initial search session has terminated. The data sent and retrieved may have a specific purpose, for example, it may enable data related to one or more items or services to be searched for, and the results may be presented in a form facilitating the purchase of one or more items or services such as is described in the inventors copending patent application GB-A-0322880, entitled "PURCHASING SCHEME", the contents of which are hereby incorporated into this description by reference.

Search systems for retrieving data (i.e., information) from distributed computer systems such as the Internet are known to have certain limitations. Internet search sites, for example Google™, are configured to return results within a time limit which appears almost instantaneous to the user of the search site.

Consider the case where a person enters a highly complex search request on such a search site, for example, a search request involving perhaps a complex string of key words and Boolean operators. If the search request is sufficiently complex then conventional search sites would not be able to return any results complying with the

search query criteria in the short period of time which is usually set for determining and displaying the search results.

A search entered on a conventional search site usually has to generate at least one search result within a specific period of time or the search site will display a negative search result to th4e user of the search engine. There is no mechanism to accommodate complex searches or to provide a search storage facility so that a user may in fact "log-off" the search site and retrieve their search results at a later point in time. The users of such search sites are effectively limited to the length of session that they can have with the search "server".

Other limitations include the user of a search site being unable to select where the search results are sent or how the search results are to be formatted and presented. For example, a user may enter a search request on a personal computer type terminal having a conventional display attached. However, the user may not want the results until a few hours have passed so that complex information can be retrieved and they may want the results to be displayed on their mobile phone.

Another limitation is that only restricted preferences are currently stored for users normally on the user's terminal or on the search "server". For example, preferences stored on the user's terminal can be provided by Internet Explorer 6 (IE6) predictive typing, stored lists past sites or content filters. Yahoo portal customisation is an example of the latter. However if one were to search for Manchester City and want information on the city itself and not the football club of the same name, it would be impossible to record a negative preference such as "AND NOT football" which would be retained for parsing future search results.

Another limitation is that current search methods do not support providing results in a variety of different formats. For example, current search methods do not enable a search engine to send an Email, phone a hotel and fill in a web form automatically. This is because search methods known in the art do not have the deeper understanding of the search preferences which would be required to implement such a sophisticated search method, as known search methods have no mechanism for understanding the

context of the search, for example, – where the user is, the time, the preferences, etc, nor do current search methods offer a permanent state storage.

A further limitation is that it is sometimes onerous for the searcher to enter very detailed search criteria, and if the detailed search criteria contain information which would perhaps normally be private, the user may be reluctant to include such information in their search. It is furthermore very advantageous if a user can request certain information and for it to be automatically accompanied by information specific to the user requesting the search without the user having to either enter or even be aware of the content of the information sent. This is very useful in a medical or financial context, for example, where the user's medical records may influence the type of information returned by one or more sites polled for information in the search process or where the user's financial history may influence the type of information and rates offered should the user search for certain financial information, for example a loan.

The present invention seeks to mitigate and/or obviate limitations known in the art by providing a search system and method which supports complex search queries being entered and which modifies searches according to user preferences. User preferences are also used to perform supplementary searches to obtain more detailed information and to designate end terminals where search results are to be sent. Additional information on the user may also be provided either by the user's client terminal or by the proxy server administering the search. The additional information may comprise information which is confidential. The confidential information may conveyed in appropriate searches in a manner which results in the details of the confidential information conveyed being not visible to the user. The confidential information conveyed may be viewable only by certain secure sites which receive requests for information relating to the user entered search criteria from the proxy server.

Summary Statements of the Invention and Advantages

One aspect of the invention relates to a method of searching for data to be retrieved from a distributed computer system, the method comprising: generating a search request at a user end terminal comprising at least one search criterion and an identifier for the entity generating the search request at the user end terminal; modifying the

search request at a user end terminal to indicate at least one user preference; forwarding the search request to a proxy terminal arranged to forward the search request to a data source capable of retrieving data from the distributed computer system, the data source being capable of providing a search result to a user end terminal selected in accordance with one or more predetermined user preferences.

Another aspect of the invention relates to a method of searching for data to be retrieved from a distributed computer system, the distributed computer system comprising at least one user end terminal capable of communicating with a proxy server, the proxy server being capable of communicating with at least one data source capable of retrieving information from the distributed computer system, the user end terminal being adapted to be operable by a user who is registered with the proxy server with a unique user identity, the user identity being associated with a set of user preferences, the method comprising the steps of: generating a search request at one of said at least one user end terminals, the search request indicating at least one search criterion to be met by the data to be retrieved; sending a search request message encapsulating the search request to the proxy server; associating the search request message with a unique search number associated with the user's unique identity; forwarding the search request message to at least one data source arranged to process the received search request message; performing a search according to the encapsulated search request; sending a search result encapsulated in a search result message to the proxy server; de-encapsulating the search result message; processing the search result according to the set of user preferences; selecting one of said at least one user end terminals according to the set of user preferences; and sending an search result message encapsulating the processed search result to said at least one selected user end terminal.

The remaining aspects and preferred features of the invention are as set out in the claims. According to the invention, a search result could be forwarded by the proxy server to a data source by the proxy server sending an electronic mail message to an electronic mailing list associated with the search result, or by filling out a web page (e.g. for insurance quote) automatically. The data source may not be accessible via another server but could be accessible via instead an IP-PSTN gateway, for example, if the proxy server uses automatic speech generation and recognition technology to phone up a hotel and actually request a price using some conversion means to convert the text

version of the search request into a spoken version. The data source may comprises a server and an associated search engine. The invention seeks to enable the user to terminate the session with the search server prior to the search results being generated, which enables more complex search requests to be processed. The invention also enables the user to receive search results more rapidly if the result is sufficiently conforming with the user preferences to be determined as a high priority. In this way, the user is provided with more relevant results faster.

Preferably, the user identity is associated with one or more static and/or dynamic addresses. Examples of static/dynamic addresses include – an E164 address (please explain what this is/means), an IP address, a telephone number for a facsimile, a pager number. Examples of a data source include any source of information which is available via the distributed computer system. The data source is preferably running the special search software (module #3) for greater functionality and better optimisation. In alternative embodiments the data source may comprise a web page.

The search result message may encapsulate the processed search result. Alternatively, the search result message may provide a key to enable a user retrieve the processed search result. For example, an SMS could be sent to alert a user of a particular search result having being obtained and provide the user with a key (e.g. a code or encrypted message) which enables the user to retrieve video from a store. It is envisaged that such "alerts" will be very useful where a search result indicates a file has been located as it would enable the user to connect to the proxy server using a suitable bandwidth connection.

Advantageously, the invention supports SMS messaging to alert users to search results and providing a user with a key to enable the user to retrieve a file via a high bandwidth connection such as a WLAN. For example, if a video clip was located, a user might wish to access this from a WLAN because the file is too big to view/download over a dial-up bandwidth connection.

The invention seeks to enable the search process to be performed more efficiently by including additional information provided by the user preferences in the search request and/or using additional information provided by the user preferences to remove less

relevant search results which are returned to the enhanced SIP server prior to these results being forwarded to the user. The invention thus enhances the RFC (please defined this) functionality of the server software over the normal search software which a server may have. The search can be forwarded to the most appropriate user end terminal for the content of the search result. The search can also be forwarded to the user end terminal which the user is operating at the time the search result is forwarded. The SIP proxy server is able to store results which are received when an appropriate user end terminal cannot be identified as one which is being operated by the user. The SIP proxy server may then modify at least one search result or generate another form of notification to alert the user to the search result and to indicate to the user how the user may retrieve the search result.

The preferred features of the invention as set out by accompanying the dependent claims may be combined with any of the aspects of the invention as set out by the independent claims in any manner which is apparent to those skilled in the art. Specific embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 shows schematically a SIP-supported data retrieval system according to an embodiment of the invention;

Figure 2 is a flowchart showing schematically steps in a method of searching for data according to an embodiment of the invention;

Figure 3 shows steps which occur at an end user end terminal in a method of method of searching for data to be retrieved from a distributed computer system according to an embodiment of the invention;

Figure 4 shows schematically an example of the fields in a SIP header and Search Description Protocol according to the embodiment shown in Figure 3; and

Figure 5 shows schematically an embodiment of automatically completing a transaction to secure an item returned by the search result according to another embodiment the invention;

Figure 6 shows steps in a search method according to one embodiment of the invention in which a data source contacted during the search requests additional information from the searcher;

Figure 7 shows schematically a scenario in which a search method according to the embodiment of the invention shown in Figure 6 may be implemented; and

Figure 8 shows schematically steps in the search method embodiment of the invention shown in Figure 7.

The best mode of the invention as currently contemplated by the inventor will now be described by means of specific embodiments of the invention. The best mode of the invention as currently contemplated by the inventors is supported by the session initiation protocol (SIP). SIP is the Internet Engineering Task Force's IETF's standard for multimedia conferencing over IP. SIP is an ASCII-based application-layer control protocol and is defined in RFC 2543, a copy of which is filed herewith and the contents of which are incorporated by reference.

SIP can be used to establish, maintain and terminate calls/sessions between two or more end-points. More specifically, SIP provides session management within a packet telephony network which provides the ability to control the attributes of an end to end call as well as signalling which enables call information to be carried across network boundaries. Thus SIP provides the ability to: locate the endpoints via address resolution, name mapping and call redirection; determine the media capability of an end point; determine the availability of an end point; establish a session; handle the transfer and termination of a call; and have an identity associated with one or more address mappings, as is well known in the art and defined by RFC 2543.

Those skilled in the art will recognise that although the invention is described in the context of the SIP protocol as described in RFC 2543, the invention is not limited to the SIP protocol per se but extends to any protocols derived from the SIP protocol which support the SIP functionality used by the invention. For example, the invention can be

implemented by any protocol which enables a proxy server to: locate the endpoints via address resolution, name mapping and call redirection; determine the media capability of an end point; determine the availability of an end point; establish a session; handle the transfer and termination of a call; and map an identity to a number of static and/or dynamic addresses, providing the protocol also enables a search session to be given a unique search identity by proxy server search software, and providing the search is been initiated by a user registered with the proxy server and assigned unique user identity having the above properties, and providing the proxy server is able to associate the user identity with one or more user preferences. These features of the protocol are necessary to enable the proxy server to modify and/or filter the search query as appropriate and to select a user end terminal to forward the results to in an appropriate format.

Referring now to Figure 1 of the accompanying drawings, a distributed computer system over which data can be retrieved using a search method according to the invention is shown. In Figure 1, a SIP-supported data searching system for retrieving data using a distributed computer system according to an embodiment of the invention is shown. The SIP-supported data retrieval system comprises a plurality of devices supported by appropriate software modules enabling the devices to interface with each other over the distributed computer system.

The distributed computer system shown in Figure 1 comprises a communications network which includes at least one user operable end terminal 10, a SIP proxy server 12 and at least one data source 14. The end terminal 10 may comprise any type of device capable of relaying information to the SIP proxy server 12 in the form of a search request. As shown in Figure 1, for example, a personal computer 10a or a mobile phone type device 10b capable of connecting over the communications network to the SIP proxy server 12, which may its self comprise a plurality of components, for example, a central server 12a and a data storage facility 12b, which may for example provide a database of user preferences and/or past search results, or search results which have yet to be communicated to and/or retrieved by a user who has submitted a search request. In certain embodiments of the invention, the SIP proxy server 14 may itself comprise a distributed computer system, for example, the proxy server may retrieve the

user preferences from a separate data base storage system via a communications network.

Those skilled in the art will realise that a variety of forms of connection (wireline, wireless, dial-up, broadband ASDL etc, LAN etc connections) are possible and that the end terminal 10 could be a portable device. As the connection need not be permanent an end terminal 10 which sends a search request to the SIP server 12 does not need to remain connected to the SIP server 12 after the search has been sent to the SIP server 12. The invention enables an appropriate end terminal 10 to be located for forwarding a search result to, according to one or more user preferences established by the user and/or by the end terminal software and/or proxy server software. A user end terminal 10, the SIP proxy server 12 and a data source 14 interface with each other either directly or indirectly as appropriate according to specific embodiments of the invention, for example, search results returned by a data source 14 may be sent (if a user preference/search request permits it) directly to an end terminal 10 in one embodiment of the invention.

Referring now more specifically to Figure 1, two end terminals 10a, 10b shown by way of example comprise a personal computer-type 10a and a mobile telephone type device ,10b. End terminals 10a,10b are each capable of being connected independently to other elements in the computer system, i.e., to a the SIP proxy server 12 and to at least one data source 14. It will be appreciated by those skilled in the art that the data source 14 from which or via which information is retrieved does not need to be limited to the specific examples 14a,14b,14c shown in Figure 1. In Figure 1, data source 14a comprises a web server, data source 14b comprises a search engine (or database), and data source 14c comprises a phone terminal.

A plurality of software modules #1, #2 and optionally #3 are provided, components of which may be localised on an individual device or may be distributed across one or more devices. Software module #1 comprises end terminal software (ETS) which runs on the user end terminal 10a and interfaces via SIP user agents with software module # 2 which comprises SIP server software (SSS) run by the SIP proxy server 12.

Software module # 3 is provided optionally at the data source 14. The data source 14 may comprise, for example, a conventional search server or even a phone type device such as 14c in Figure 1, which may not be provided with software module # 3. For example, consider where the proxy server 14 is querying a conventional search engine such as Google™, and where no new software is provided (i.e., if software module #3 is not present on the device queried), for example, the web server 14a in Figure 1.

Although Google™ can be queried in a conventional way, Google may later provide an API (Application Programming Interface) which could enable more complex, enhanced or more efficient SIP searches to take place. Alternatively, the proxy server 14 could have processes a returned search result to determine that a specific web-site should be resent the search request formatted in a specific way, for example a travel web-site for checking or booking flights. Such a web-site may operate in a SIP-enabled or non-SIP enabled manner. As an example, in Figure 3, software module # 3 comprises search database/engine software SDB which runs on the search server (equivalently known as the search engine) 14b.

The term end terminal 10 as used herein refers to any device suitable for generating a search request and/or receiving a search result. The user end terminal 10 can comprise a personal computer type device 10a as shown in Figure 1, however, those skilled in the art will appreciate that the user end terminal 10 may comprise any device capable of remotely accessing the search engine and/or displaying search results, for example, a personal digital assistant type device such as the PalmPilot™, or a mobile telephone type device 10b such as is shown in Figure 1, which a user can operate. The end terminal 10 to which the search result is sent may not be the same end terminal 10 which generated the request.

In one embodiment of the invention, the end terminal 10 which receives the search result is not capable of generating a search request, but is capable of displaying a search result (for example, the user end terminal 10b may comprise a mobile phone type device which does not have sufficient memory capacity to support the generation of a search request, but which can receive a search result in the form of an small message service (SMS) text message).

A user of an end terminal 10 is assumed to have set up a SIP identity URI, in the manner described in RFC 2543 for example, and requests a search by entering an appropriate search query into an appropriate search application. The search application can provide any appropriate interface for the user to enter search terms, and it will be appreciated by those skilled in the art, that whilst a computer type terminal such as is shown in Figure 1 would support a sophisticated Graphical User Interface, if a search were to be requested by a less sophisticated device, the user interface can be much simpler.

Figure 2 shows steps in a method of searching for data to be retrieved from a distributed computer system according to the invention.

In Figure 2, in step 20, a user initiates a SIP search session at an end terminal 10 and generates a search request which will include information on the user's SIP identity. The user's SIP identity could be entered either manually by the user as part of the search request but in the best mode of the invention is generated automatically as a result of the user initiating the SIP search session.

The search request comprises at least one search criterion and is generated using an appropriate search software application adapted to interface with the ETS (end terminal search software module #1). When the search is requested by the user, the search software application passes the search request to the ETS. The ETS software module then modifies the search request according to at least one user preference in step 21.

A user preference used to modify the search result at the end terminal 10 may have been determined in a variety of ways. For example, the user preference may have been either predetermined by the user who has entered a personal profile comprising a set of one or more user preferences (for example, no interest in football or strong interest in Bath as a town/place but not as a bathroom item). The ETS software module will have associated such a user preference set with the user's SIP identity. The user preferences may be supplemented or replaced by one or more user preferences which the ETS software module has determined automatically from analysis of the user's historical search activities, i.e., by analysing which search results indicating a web-site resulted in the user visiting the web-site.

The ETS then encapsulates the search request within a SIP message in step 22 of Figure 2 using a search description protocol (SEDP) according to the invention, and sends this to the proxy server.

The proxy server then passes the encapsulated search message to the proxy server software module SSS in step 23 of Figure 2, and the SSS then de-encapsulates the search request to process the request further according to the user preferences in step 24. The further processing of the search request may be based on additional user preferences which the proxy server has determined, for example, that results from a particular data source have historically resulted in the user being more likely to access the web-sites indicated in the search result, and the proxy server may then generate a user preference for that data source to be accessed again.

Alternatively, the proxy server may have a central scheme for discounting any price which is returned in a search result from particular types of web-sites according to a scheme which the user has subscribed to. The amount of discount may be fixed or vary according to certain conditions. The fact that discounts should be obtained and/or the details of organisations which the user is a member of could be provided as user preferences which are used to modify the search request.

The user preferences which the proxy server has noted may also vary and not be fixed, for example, according to the time the search is generated and according to the priority of the search. For example, the proxy server may note the search is urgent and so will always notify the user immediately a result is received, even if the user preferences forwarded by the ETS indicate a user preference for not notifying immediately). Thus one or more proxy server user preferences may in some embodiments of the invention, override one or more end terminal user preferences.

The proxy server then processes the search result and forwards it to a data source in the appropriate format in step 25, for example, either as an email or a normal search request to a non-SIP enabled search server such as 12a shown in Figure 1, or even convert the search request to a suitable query and connect to a telephone data source 14c such as Figure 1 shows.

The data source 14 then processes the search request to generate a search result which is conveyed as a search result message to the proxy server 12 in step 26. Depending on the type of data source, the search result may comprise a audio file, for example, if the data source is 14c, the person answering the query may have their answer recorded as a voice-memo and stored in an audio format. The answer may however, be converted at some suitable point using speech to text technology to a text file, and the search result would then have a more conventional format.

The user may have set up a preference to convey an indication with the search request that search results should be sent directly to the user's end terminal in some embodiments of the invention. For example, if the request is very urgent or if the user has a preference set up that results returned in email format should be forwarded directly to the user's mail server and not returned for further processing by the proxy server. This direct return of the search results option is not indicated in Figure 2, as in general the search results will be processed by the SIP server to determine an appropriate location for the results to be stored and/or sent to an end terminal.

The proxy server 12 de-encapsulates the search message it containing the search result then processes the search results received, and generates a search result having a format compliant with the user preferences and/or with the end terminal to which the proxy server has determined the results should be sent to in step 27.

Unlike a conventional search request, which may simply return a website where a user must then re-enter additional information if the user generates a search request for "cheap flights to Egypt", the SIP proxy server 12 is able to process the search result to enable further interrogation of a data source to determine more relevant search details. This further interrogation may be enabled either by the initial processing performed in step 24 of Figure 2, or as part of an iteration of the search process steps 24 to 26 performed within the processing performed in step 27 in Figure 2, prior to delivering this to the user end terminal.

As an example, if data source 14a returned a URL for a web-site for a travel company that has an on-line booking system, the SIP proxy server may already be aware of the

format the on-line booking system would require to find out specific details of flights and would then provide information to enable the booking system form to be effectively filled in. Alternatively, the SIP server may interrogate the booking system to determine the information required. Once the SIP server has obtained a specific result which conforms with the user's search request to the level required (i.e., specific flight information has been obtained), the SIP server forwards this information as a search result to the user. If the SIP server is aware that the user has frequent flyer miles or is a participant in another discount scheme (either as an individual, or if some organisation the user is a member (and which is recorded in his user preferences) has a discount scheme), this information might also be submitted by the SIP server, so that the user is also given information on the price of a flight which takes his frequent flyer miles into account. In this way, the search results returned by the SIP server are much more relevant to the user. In a similar manner, car insurance sites, theatre ticket sites, etc., and all be further interrogated to get specific information relevant to the user's initial search enquiry.

The method of encapsulating the search within a SIP message is performed using any suitable search description protocol (SEDP) which can be devised to provide a structure to the search request generated by the user at the end terminal 10. For example, in one embodiment of the invention, the SEDP provides a structured search request format which includes fields to indicate a set of search characteristics. The search characteristics provided indicate the type of search and a range of at least one search criterion, and may optionally include one or more user preferences. The one or more user preferences can be generated by the end terminal SIP software module #1 or by the proxy server software.

Figure 4 shows an example of a SEDP, and is described in more detail later on, but in general a an search description protocol according to the invention will support one or more of the following characteristics:

      Security (encryption);

      User SIP id;

      a variety of search descriptions fields (eg XML/free text/keyword selection);

      information on current session context (what user has been doing eg Email, how long connected, how long on current IP address,....); and

information on cached recent searches on terminal (eg large files might be held on the terminal and should not be sent again).

Those skilled in the art will appreciate that Figure 4 shows only some features of a search description protocol SEDP according to the invention and another protocol which is able to encapsulate the search request within the SIP message could be implemented instead. The essential feature is that any search description protocol needs convey at least the search request information and the user's SIP identity universal resource indicator (URI). In one embodiment of the invention, the ETS may be configured to format the search string the user has entered so that this conforms with a more efficient search expression. In another embodiment of the invention, the ETS may cache one or more previous searches. This enables the ETS to add updated information to a cached search to facilitate the search request process.

Returning to Figure 1, a user terminal generates a search request which is encapsulated by the end terminal SIP software. The encapsulated SIP message is then transmitted from the user end terminal to a SIP proxy server 12 with which the user has registered the user end terminal as a SIP terminal 10. The SIP proxy server 12 may have several registered user end terminals which the SIP proxy server is able to determine are associated with a particular user SIP identity.

When the SIP proxy server 12 receives the encapsulated SIP message, the server forwards the encapsulated message to the SIP proxy server software module #2 SSS. The SSS software module then processes the received message to de-encapsulate it. The SSS software module then analyses the search request in accordance with a predetermined set of search rules which are configured by the SSS and which may be determined at least in part by at least one user preference which the SSS is able to associate with the user's SIP identity URI.

In one embodiment, the SSS software module may further modify the search expression and/or select specific servers within the distributed computer system to forward the search expression to according to the user preferences associated with the user's SIP identity URI.

The search is modified in accordance with any specific user preferences. The user preferences which are used to modify the search may be a subset of the total user preferences which are available, and the SIP proxy server 12 may select the user preferences to be used to modify the search by analysing the search request and determining which user preferences are appropriate to the search. For example, the SIP proxy server 12 may select a user preference to indicate search results should be sent to home if they relate to a leisure activity and to work if they relate say to financial items, so that the user preference for which end terminal results should be sent to is selected according to the type of content which the user has requested. By incorporating user preferences, the SIP proxy server software can perform certain additional steps to ensure any personal preference information associated with the user's SIP identity is incorporated into the search request as a supplementary search expression, or use the users personal details to perform a supplementary search to obtain more relevant results, or even purchase an item located by a search.

For example, the SIP proxy server 12a may access database 12b to retrieve a set of at least one user preferences which are associated the user's SIP identity, such as the user's hobbies, the user's search preferences, the user's past search results, the user's past user actions after search results, and the user's most frequently accessed web pages. These user preferences are then used to reconfigure the search request. The user preference information could be used by the SIP server to add supplementary search expressions which include negative search criteria. For example, a user preference to indicate that unless expressly entered as a key word, no results should refer to a specific keyword should be included. In this way, a user can set a user preference for a keyword such as "Football" to not feature in any search results. The SIP server then can modify received search requests to automatically include in the search expression information equivalent to the boolean expression "AND NOT football". The modified search expression then results in search results being returned to the user which exclude football-related information. This is advantageous as if the user's preferences indicate the user wishes to exclude search results for football related sites when a search is being performed over a communications information network such as the World Wide Web on the Internet, a search for "Manchester" for example, would not result in search results being forwarded to the user which referred to "Manchester city" or "Manchester United" or any other football related site which mentioned "Manchester".

The user's preferences may include search site preferences which would indicate one or more search sites are to be included (and/or excluded search sites) in the search, a maximum search time for the search to be active, and search result terminal and/or result formatting information.

The SIP server 12 then selects a number of search engine/server/sits in further SIP messages. The further SIP messages may be encapsulated or may not be according to whichever form is most suitable for the specific server being queried. For example, some messages could use a new protocol if a server was equipped with an appropriate search interface – API) between the SSS and SDB. The protocol would need to have one or more (ideally all of the following features):

      be secure (e.g. the protocol might use Ipsec);

      provide authentication – for example, the protocol might require authentication of servers (to check for Fakes);

      support compression (of the query and/or of the result); and

      allow caching on the SIP proxy ideally (at a very high level, for example, if a highly popular football team scored a goal and the number of users who may search for a video clip of this to download could reach as high as 10 million, however, the SIP server would only need to retrieve this video clip once !).

More than one protocol could be utilised to transport the SIP messages, for example, if a SIP Proxy server needs to provide queries in a number of ways, for example, the server could send a normal email to a mailing list requesting more information on the search expression (or an expression derived from the search expression), or even (using a suitable automatic voice generation application) phone a hotel, or fill out a Web form (all of which forms of further querying use different transport protocols).

As an example, in a typical query message according to the invention, the following information could be provided:

      Origin IP address:123.32.123.001

      Origin URI :name.surnameofuser@atelco.com

      Hash:4387t84gf8t4f84tg83rtf8p32yh239f8y[98fy9[8747643865gffgyfrjylegfgv,ueg yvjgvy

Search reference: 653467252

Search terminal type = Pentium III PC

Account type: Individual

Average internet access activity duration: 2 hours

Previous Activity: email

Location of terminal: Ipswich, England

Request type: TRAVEL

Request: Date 23/1/04;

From: Stansted;

To Moscow;

Time: unspec;

Cost CHEAPEST;

Return No

End ReqType

Return:: Instant(123.32.123.001), update (day, Mobile- name.surnameof user@atelco.com)

    Cost – Bill.1

    END

Each search is assigned a unique search number by the SIP proxy server 12 so that the SIP server 12 is able to match any replies to the original search request even if the user is not longer in communication with the SIP proxy server 12 via the user end terminal 10.

When the SIP message carrying the search request is received by a data source 14, typically an information source such as a search server 14b, the message contents are extracted and are processed by the appropriate SIP software module located on the other server, e.g. the search engine SDB software module #3 located on the search engine of a search server. Alternatively, if the SIP server chooses another transport protocol, the message contents may be processed in the normal way (eg Web form) for the site queried, for example, as would happen if a conventional search engine (i.e., non SIP enabled) were queried by the SIP proxy server 14. ,Also, if a SIP server 14 forwards the search request to a data source such as a mailing list or email address for a particular body or organisation of interest regarding the search request (whose addresses may have been located by earlier search requests by the user or provided by

a preliminary search result generated by a conventional or SIP search engine), the data source will not be SIP enabled.

When a search request message is received by a data source 14 , if the data source 14 determines one or more results to the search criterion/criteria set by the user's search request, the data source will forward the search results in an appropriate manner to the SIP proxy server. Where a SIP server 14 has actually telephoned a number and announced the search using text-to-speech technology, the person who responds to the search may be given a number to contact and a password so that they can respond later to the query. When the person dials the number, they may be presented with the option of entering the code, and then be allowed to record a message. The message can then be associated with the SIP identity of the user and the search identity using the code entered. This then enables the message to be forwarded to the SIP server which might convert the audio file to a text file using speech-to-text technology, or forward the file to the user as a search result for the user to play on their machine. A similar process is undertaken where the SIP search message is forwarded to an email or mailing list address so that any response can be identified by the SIP proxy server with the user's SIP URI (or key to get information at a later point in time (see the description above).

When a SIP enabled search engine 14b encapsulates one or more results in a SIP message together with the unique search number and forwards this to the SIP server, this enables the SIP proxy server 12 to associate the search result with the SIP identity of the user who requested the search.

When the SIP proxy server 12 receives a SIP message it extracts the search result and search number. The SIP proxy server 12 associates the search result with the SIP identity of the user who requested the search. The SIP proxy server search software module # 2 SSS may store results for a specific search number according to the set of user preferences for a predetermined period of time or until a specific number of positive search results are received. Null search results can be forwarded by the SIP proxy server to the user and/or near matches provided in accordance with the user's preferences.

The SSS software module then determines the user's current location (as located in the SIP location database), the user's terminal type at that location and format (determined in accordance with the user preferences). For example, if the user does not wish to receive the search results until a certain time, or does not wish to be disturbed, if this information is recorded on the SIP database of SIP user preferences, then the SIP proxy server is able to process the search results appropriately and format the results for the appropriate terminal display.

The user may also specify more than one location for results to be sent to, for example, a short descriptive form (for example, just a town if the user has search for a company's location) may be sent to the user's mobile phone, which could alert the user to log into their personal computer (to which the SIP proxy server software would have sent a SIP message which encapsulated the full address of the firm as a search result).

As SIP associates currently valid addresses with a SIP user ID, and uses these to deliver the search results there is not need for a user to retain an open search session with the search engine whilst the search is being performed. The search can use permanent SIP addresses which enables results to be collated and a user is therefore also able to specify if, for example, they wanted results to be returned collected into 10 "hits" until the search time has expired, after which any remaining searches should be sent to the user.

As the user is able to designate the terminal and format the search results are to be provided by, it will be appreciated by those skilled in the art that the search results could be provided in form which is accessible when the user next runs the search software module #1 search application, or alternatively be sent in the form of an electronic mail message (e-mail message) or short message service (SMS) message.

As the protocol user identity associated with the user, for example, the SIP URI name.surnameoftheuser@atelco.com, is permanent, this can be associated with a number of addresses/phone numbers which may be static or dynamic, for example, with telephone number such as 01234 123 456 or an address such as 111.223.123.011...)

Another aspect of the invention relates to a distributed search environment in which the SIP proxy server search software module #2 determines the capabilities/specialities of one or more search engines/servers within the distributed computer system. For example, this could be achieved by sending a request for information to the search engines/server, but other mechanisms which can be used include web crawling (for example, such as Google™ implements) or by being sent advertisements, or any other way in which it is possible for the proxy server to discover their capabilities/specialities. The search software running on these machines uses another protocol (Search Capability Protocol CCP) to describe their capabilities (for example, speed, data bases searched, the type of files searched (e.g. *.doc, or *. pdf file names), etc. to the SIP proxy server 14. The SIP proxy server 14 is then able to determine which search engine is most suitable for a user and/or a specific search requested by the user, for example, by considering the search request, user preferences.

Example 1.

A specific embodiment of the invention will now be described by way of example with reference to Figures 1 and 2 of the accompanying drawings.

Consider a user who wishes to locate information on trams. The user has a history of accessing many tram and transport related web-sites on the Internet, has transactions which record the purchase of model trams, and is listed on at least one transport enthusiast email list.

The SIP proxy server has recorded this information in association with the user's SIP identity and the user is assumed to have set their preferences to indicate that they are interested in transport. Accordingly, both the ETS software module and the SSS software module will record this information as if the user has used SIP for all of their sessions, including browsing, email and Instant messaging, all the information built up about the user's information sources and preferences will be accumulated in association with the user's SIP URI identifier – for example users.name@businessname.sip.

Repeated use by the user of the information retrieval search system according to the invention will result in the user having activated (for example by clicking on a highlighted URL returned with the search results) features which fall into the set (site type =

museum, request = information,...etc) and this information will be stored on the SSS. Other data mining of the user's previous sessions can also be used to optimise the search to suit the user's preferences.

Consider the user has the specific request of wishing to restore an old tramcar and so the user enters the search phrase "tram, restoration, projects, buy" in step 20 of Figure 2. The user may naturally supplement these search terms with appropriate Boolean operators and wild card characters etc, however, a simple key word such is given here as an example with the implicit assumption the key words are separated by commas and link by an inherent "AND" so that all the key words must be present before the search results are returned.

The ETS software then parses the search request to indicate additional information which is accessible to the ETS software in step 21 of Figure 2, for example:

Search terminal type = Pentium III PC
Account type: Individual
Average internet access activity duration: 2 hours
Previous Activity: email
Location of terminal: Ipswich, England

...

This request is then packaged, using the Search Description Protocol, in a standard SIP message in the manner described in RFC 2543 and transmitted along a communications link to the SIP proxy server 12 in step 23 of Figure 2.

The SIP proxy server 12 then passes the (unopened, i.e., still encapsulated) message to the SSS in step 24 of Figure 2. The SSS is an "intelligent module" capable of making requests to a large number of databases and specific sites or search engines (some but not all of which may have SDB software modules). As an example, the SSS can send the request to one or more of a plurality of different information forums, for example:

i)   the SSS can send a request to a news group on trams in the form of a
        request for information which the SIP server automatically generates;

ii)   the SSS can send the request to a transport web-site that logs potential
projects and restorers (and tries to match the two) which has SDB
software which enables the two software modules to create a user entry
(as the user might need screening from replies this might be to an email
account: <u>876462965@atelco.com</u> which is created just for this search
entry alone, and which would therefore screen the user from spam email
which might otherwise be generated if the user's normal email address
was given);

iii)   the SSS can send the request to a standard search engine such as
Google™ (<u>www.google.com</u> or <u>www.google.co.uk</u>) from which the SSS is
able to request a specific number of results, for example, 1000
responses. The SSS then filters the responses provided by the
conventional search engine to ensure that the search results conform with
the user preferences the SSS is aware of for the SIP user identity which
requested the search. The SSS can further interrogate the user if the
SSS detects that ambiguous results are being generated (for example, by
using a built in statistic/pattern matching program the user could be asked
"Do you mean you want to BUY a TRAM?"). The SSS can then
incorporate the user's response to such a further query to refine the
search terms the SSS uses to interrogate standard search engines;

iv)   the SSS can send the request via email to one or more other individuals
or mailing lists who/which the SSS is able to determine have associated
with trams as a subject matter of interest; and

v)   the SSS can send a request via email to a museum such as the national
transport museum.

<u>Example 2</u>

Figure 3 shows in more detail steps in the process of generating search request at the
user's end terminal. In Figure 3, in step 30 a user initiates a search session at the user
terminal, for example, using either text or speech (and a suitable application to generate
text from the spoken search request). The ETS parses the search request to identify a
possible pro-forma it is aware of for that type of enquiry in step 31, for example, if the
search has a travel or financial aspect. This enables direct interrogation of web-sites
such as travel sites, and may remove additional processing of search requests/results by

the proxy server such as were described in the context of step 27 in Figure 2. If additional information is needed, the ETS may request this of the user and if the ETS detects a mistake, then it may query this with the user. In the context of a travel enquiry, the ETS may provide the user with a generic form which requests departure dates, cost preference etc, and if the departure date is before the arrival date detect this as a mistake.

The ETS checks to see if previous searches have been performed in step 33. For example, the user may have requested the same information a few days earlier, in which case the generic form may be presented to the user with appropriate information already completed, or the ETS may alternatively have cached some search results. If a similar search has been recently performed and is held in cache on either the end terminal or on a server such as the proxy server 12, then only an update needs to be sent to the user.

The ETS then formats the search request in step 34, for example, the travel search request may have a pre-set "destination, time, departure point, time" field format.

The ETS then encrypts the search request with a session key in step 35, which was established when the user authenticates at the start of the association of the address of the end terminal and the SID id.

The ETS then places the encrypted payload in a SIP message with TYPE set at SEDP (the search description protocol) in step 36.

The ETS then sends the SIP message to the proxy server in step 37.

Figure 4 provides an example showing the format of a SIP header and SEDP search description according to an embodiment of the invention.

The SIP header includes at least the following information:

i)   INVITE sip:search@bt.co.uk SIP/2.0 – this indicates the SIP header relates to the invitation from the SIP server to a search engine

ii)   VIA: SIP/2.0/UDP spainltel:5060;

iii)   From: Joe Bloggs<sip:joe@atelco.net> - this is the SIP URI of the user;

iv)   To: Search <sip: search@uk.net> - this provides the SIP URI of the search service;

v)   Call-ID: 10000001@atelco.net – this is the call of the SIP session, which can terminate early before the search result is returned;

vi)   Cseq: 1 INVITE – this is the sequence number of the SIP call;

vii)   Subject: Urgent Search – this could be a plain text entry or provided as a field which an end point uses;

viii)   Contact: Joe Bloggs <sip: joe@atelco.net>

Additional fields which the invention provides in the SIP header indicate the SIP payload, and include:

ix)   Content-Type: application/SEDP – the type could be used to send an IP address, but in general is used to indicate that instead of a MIME type application, the application is a session description protocol according to the invention, SEDP (SEarch Description Protocol);

x)   Content-Length: 160 – this indicates the size of the payload, the number 160 is given by way of example only.

Figure 4 also indicates a SEDP according to an embodiment of the invention where a travel enquiry forms the body of the search expression. As shown in Figure 4, the SEDP comprises the following:

i)   Type: travel.air – the type field indicates a specific search field where appropriate;

ii)   F= Luton; 13,4,04; d = Ulan Botar; 28,4,04; ; ; - these fields indicate the point of departure is Luton, the departure date is 13 April 2004, the destination is Ulan Botar and the return data is 28 April 2004, followed by a number of null fields.

iii)   AP = British A, NOT Aeroflot, other – these are user preferences which indicate positive preferences (British Airways) and a dislike (Aeroflot)

iv)   P = Price – this field is being used to indicate that price is a priority feature of the search

v)   U = instant; update (phone1)- this field is being used to indicate that the search results should be communicated to the user end terminal indicated by phone 1 instantly when they arrive.

vi)   T = urgent – this gives the priority of the search;

vii)   OS = Hotel, Car Hire, Insurance – these are other services which are relevant given the category of the search, so the proxy server may wish to report information on these services if they are returned by a data source;

ix)   Sid = 7684^^*jjkkj84 – this is the ETS session identifier which resides above the SIP id, and which may or may not be associated with SIP.

Fields ix) and x) in the SIP header (and so also all the fields in the SEDP search description in the payload) may be encrypted in some embodiments of the invention, as indicated in the steps outlined in Figure 3 of the accompanying drawings.

Example 3

Figure 5 shows an very specific embodiment of the invention in which a user indicates they want a hotel room in a specific location (for example Salzburg) for a specific duration (for example 2 nights) at a specific cost (under £30 a night) in a search request in step 50.

In step 51, the ETS passes the search request and asks for more information, for example, the number of people, the exact location, and type of room, and a start date.

In step 52, the ETS forwards the message to the SIP proxy server whose SIP search server software SSS then processes the message (having de-encapsulated it).

In Step 53, the SSS sends an initial search to several travel search sites, some of which have enhanced SIP search interfaces but some of which may be standard world-wide web WWW servers.

In Step 54, the results returned are negative as the price cannot be met. The proxy server then may ask the user for more information or to revise the search and/or ask if the duration of the search could be extended so that search results could be returned at

a later point, for example, 1 day later. In Figure 5, the user sends a response to the SIP server that it is possible to perform an extended search and for results to be provided 1 day later. The SSS then searches for hotels which do not have on-line booking facilities to determine email addresses and/or telephone numbers on travel web-sites and tourist information sites.

In Step 55, the SSS sends out email enquires in a format generated from the search request, and phones up hotels using text-speech and speech-to-text converters. The SSS obtains a near result and noting that the user is a member of at least one potentially relevant organisation, provides this additional information to the hotel providing the near result to obtain a discount, for example 10%.

In step 56, the SSS checks the user's location database and determines that an SMS would be most appropriate (for example, the SSS may recognise that the time is outside the usual range of hours a user operates their computer at home or work). The SMS informs the user that a room has been found which meets all of the search requirements and asks the user if the booking should be automatically completed. This option is possible as the user has already registered bank account/credit card details to enable automatic purchasing and may have set a user preference to indicate that automatic purchasing should be enabled. In other embodiments, the user may set a user preference to indicate that if all criteria are met, the purchase should proceed automatically without a prompt.

In step 57 of Figure 5, the SSS books the room by providing the financial information to the hotel either by email or by fax and informs the user that this has been done. In Figure 5, the SSS waits until a confirmation number has been received from the hotel and then forwards this by SMS to the user. Alternatively, the SSS could notify the user as soon as the financial details have been sent to the hotel, or have been indicated as having been received by the hotel (for example, in the case of an email being sent when a receipt for reading is received or in the case of a fax, when the fax is confirmed as successful).

As has been mentioned above with reference to specific embodiments of the invention, it is a feature of the invention that both the end terminal software ETS and the SIP proxy

server software SSS is arranged to modify a specific search expression (i.e., the phrase entered by the user on the end terminal) so that any requests for information which generated by the SIP automatically have an appropriate format for the destination to which the search request message is to be forwarded to.

The responses from these searches can be generated over several different timescales, ranging from virtually instantaneous for the conventional search engine results to several days, weeks, months or even years for the emailed requests for information. A user is able to indicate either in the search expression or as a user preference (which may be derived from the search expression), the maximum duration a search may be conducted for. This could be implemented by indicating to the proxy server 14 a cut-off time after which search results returned should be discarded.   Search results which are returned to the proxy server 14 after the initial search session has terminated can be processed as the SSS is able to associate the results with the original request using the unique search identifier associated with each search (which can be given in a form such as 1234567@aserver.telco.umts)which is issued by the SSS. The SSS is then able to process response and may iterate the search procedure to obtain additional information as the search results arrive by processing the results before the results are notified to the user.

The form of the results and the mechanism by which the user receives the results can all be set by user preferences. Typically, the user might indicate that results should be provided in one or more of the following forms:

      i)   as a weekly summary of responses;

      ii)   as an instant reply (within 1 minute);

      iii)   only best match answers should be sent via email as high priority.

The user might always indicate that the search should be cancelled at any time, and this too can be easily accomplished as the SIP search number uniquely identifies the search. The user may also

The SSS can use the facilities of the SIP proxy server and its associated location database to locate the user at any given time (since the user's IP address is not a

reliable location after several minutes or hours). The location database returns the users current terminal type and the SSS is able to adapt the response to suit the user's current terminal. As an example, consider if a tram enthusiast responds to a news group item that he has a 1933 GEC/Norwich tram in his back garden in Felixstowe. The SSS is able to determine that the sender of the email is at a user end terminal located in Felixstowe, and the SSS is able to determine the distance to Ipswich is sufficiently close (by accessing an appropriate application/database) to rank highly favourably with the user in view of the user having set a user preference that results from locations within a 20 mile radius are to be given high priority. The SSS then locates the user as being mobile and so formats the result in the form of an SMS message to the user on his mobile phone.

The SIP server is able to assess the priority of a result according to its conformance with the user's predefined set of user preferences. If the SIP server considers the result to be urgent (which could occur either because the user designated the search as being urgent or because the user indicated that if the search result indicated a close location, or a cheap price etc) then the SIP server delivers the results to the user immediately (or within a timescale the user has given in his set of user preferences for urgent results to be delivered in) in the format the user has given in the set of user preferences. For example, an urgent search result could be set either to a user at his computer terminal if the user is currently logged on to the network at that terminal with his SIP identity, and/or (depending on the user preferences) the search results could be sent via an SMS or automatically generated vocal message to the user's mobile phone.

The user is able to generate a search query and set the user preferences indicate if results should be given in any format including audio. By providing search results in an audible format, persons who are visually impaired are able to receive search results in a more user friendly manner. It is possible for persons who are visually impaired to set their ETS software user preferences so that it generates a verbal confirmation of the search string they have entered (or to repeat a spoken search request if such a mode of search request generation has been used).

User preferences could be associated by the SIP server SSS software module with the senders SIP URI so that the search results are sent to a destination user end terminal

based on the search content (for example, video files could be sent to the user's work email address if this had a higher bandwidth connection to the internet than the user's home terminal equipment instead of the user's home email address). Alternatively, the SIP SSS software could be configured by the user preferences to automatically compress the search results to a predetermine bandwidth, for example, by sending still clips of a video file to one location and the full video file to another location. Alternatively, the SIP SSS software could simply notify the user that a large file was located by the search and store the large file on the SIP server for a predetermined amount of time until the user downloads the file.

For added security such centrally stored files may only be accessible if the user further enters a security key which the SIP server 12 could send either with the original notification that the file has been located and/or the address where the file could be accessed or via a separate notification. The SIP server does not need to use message type notifications such as vocal messages, email or SMS to notify a user of a search result. Instead, the SIP server may deposit a file containing the search results in the user's public drop file etc.

If the user has requests a search to locate an item for purchase, the SIP server could be provided with the user's financial information such as their credit card numbers etc. and any other information needed to make an automatic purchase of the requested item if the price conforms with the user's set preferences. As an example, consider a SIP server which polled a flight or holiday site for example, and located for example, a return flight to Cairo on the outward and inward dates the user has requested at a specific price. If the price is, for example, either below the user's "immediate purchase" limit or is the cheapest price of a set of search results returned within a given period of time for searching, the SIP server may effect an immediate purchase of the flight so that the price information is correct and the price does not change by the time the user receives the search results. It will be obvious to those skilled in the art that such an automated purchase scheme is not limited to the purchase of airline flights, but could be extended to any item or service offered for sale over a distributed computer system, including items which are under auction but which have an immediate purchase option.

As the proxy server is able to intelligently query certain locations which it believes would be more appropriate for the user's search query, the proxy server can return results which indicate a preferential arrangement with the site providing the search result. This is particularly so if a price is associated with the search query. For example, the search engines which the proxy server access could be configured to always provide a certain predetermined discount (which may be fixed or only temporary in duration). A SIP server search service can then be provided to users whose user preferences indicate they have subscribed to a specific group or body.

For example, if a user indicated they were a member of the Automobile Association and also a civil servant, and the user requested a search for the cheapest insurance for an "S-reg" Volkswagen Punto with ten years no claims bonus, the SIP server could provide this additional member information to the servers of the insurance companies it contacts and the results returned could indicate if an insurance company is able to offer an additional discount to the user based on the organisations indicated in the user preferences.

Alternatively, if may be that the Internet Service Provider (or equivalent body) that the user has subscribed to has discounts with certain third parties such as hotels, software providers, etc., and so the SIP server itself is configured by the Internet Service Provider to offer one or more discounts to the user when it returns a result from the third parties to the user.

The SIP server could keep track of the purchases the user makes with certain bodies and assign one or more points to the user according to the amount and/or number of purchases made, which could be reset within certain timescales. These "points" could then be spent by the user, for example, to get a certain discount off a returned search price or to get an item for free if the search returns a price for that item which could be bought outright with the "points" the user has. In this way, a "reward" scheme similar to the reward schemes currently offered by many chain store retailers can be offered to the user via the SIP search mechanism, whereby each item purchased attracts points and a user is able to purchase further items and/or discounts off other items with the points they accumulate.

Those skilled in the art will appreciate that the spirit and scope of the invention is not limited to the specific embodiments described herein above but instead is defined by the accompanying claims.

One embodiment of the invention is advantageous in a wireless environment where a user has a mobile terminal. The invention enables the SIP proxy server to notify the user where a large amount of data has been located. This enables the user to elect to move into a wireless "hot-spot", i.e., a region where a high bandwidth wireless connection is available to enable the mobile terminal to download a large amount of data.

Another embodiment of the invention enables a still image from a video image file to be extracted by the SIP server and sent to a user to indicate the type of content of a video image file. The user is then able to select whether the video image is to be downloaded. For example, if a user wanted to download a trailer for a remake of a classic film, a lot of video files might be detected which relate to the original film and not the remake. The invention advantageously prevents the user from downloading large video files which do not relate to the desired content.

The above embodiments of the invention may also incorporate additional information which may be obtained either automatically or on request by the user's client terminal or by the proxy server administering the search. For example, the proxy server may perform a look-up based on the user's SIP identifier to a database record containing the additional information. This additional information may be retrieved and automatically included with the search criteria the user generates.

In some embodiments of the invention, the additional information is confidential or includes a request to obtain information which is confidential. Additional information, in particular confidential information, may be subject to a variety of access controls which may be imposed by the user or by the proxy server or by the data source for the information.

Generally these access controls will be implemented in a manner transparent to the user requesting the search, i.e., the additional information is sent automatically without the

user being aware of either the need to provide additional information or the content of the additional information provided. However, in other embodiments the user must authorise the issue of confidential information, for example, by signing a digital certificate authorising a third party to release certain information. The released information is incorporated either directly into the search request or, alternatively, provided on request to any entities meeting certain security criteria which have requested the additional information. Typically, only entities capable of providing more personalised information will issue such a request. The request for additional information can be provided with a response containing generic information. The SIP server may process the generic information and forward it to the user should the user's search request indicate that such information is of interest, alternatively, the SIP server may retain or disregard such information if the search request indicates only specific information is of interest.

The process of incorporating the additional information can be automated in any suitable manner, for example, if the context of the search conforms with one or more criteria, then additional information may be required to be incorporated and appropriate steps taken to provide this information.

The invention thus provides a method of performing a search in which specific information is provided whose context and/or content is dependent on information which is specific to an entity (generally but not necessarily the searcher). One embodiment of this aspect of the invention is shown in Figure 6, in which in step 60 a searcher issues a search request for some information relating to the search criteria.

In this embodiment, the search request is processed by the SIP search server and forwarded in the manner described hereinabove to various data sources. A data source receiving a request to provide information may determine that the search request comprises a request for information which can be answered at a generic level, but which could be supplemented by more specific information if additional information was provided which identified the entity to whom the information sought related. The data source in this embodiment responds which some general information and requests the additional information it requires in order to provide more specific information (step 61). The proxy server forwards this request to the user who authorises a third party data source (e.g. by providing a signed digital certificate) to provide the requested information

(step 62). Step 62 may be performed automatically if the searcher has configured their account with the SIP server appropriately, and this may enable the SIP server to perform the authorisation directly on behalf of the searcher/entity who needs to provide the authorisation.

Returning to Figure 6, the SIP server forwards the authorisation to the third party data source(s) (step 63). The authorisation enables the third party data sources to provide the requested additional information to the requesting data source. In this embodiment, it is the SIP server which receives the additional information provided by the third party data source and forwards it to the requesting data source so that the requesting data source can provide more information specific to the entity associated with the search request. Typically this information will be encrypted and signed by the issuing body (step 64). The SIP server then forwards this to the data source requesting the additional information (step 65). The additional information is verified by the data source (step 66) and the information is suitably processed (in conjunction with the original search criteria) to provide more specific information as a search result which is then forwarded back to the searcher via the SIP server (step 66).

Those skilled in the art will realise that may variations on the manner in which the information is requested and incorporated into the search request and search results are possible. The invention provides in each case the opportunity for information to be provided which relates to a specific entity (for example, the individual performing the search) which enable data to be returned which relates specifically to the individual.

The invention furthermore provides a means for this information to be incorporated in such a way that the entity performing the search need not be aware of the content of the additional information provided. By enabling confidential information to be provided in a secure manner, it is possible for a user to search for information that is relevant, for example, regarding a medical condition they may have without the user needing to be aware of any specific information related to their condition.

For example, a user could perform a search with criteria based on "treatment for hayfever". In this case, the proxy server could recognise the context of the search is medical. Additional information, for example, other medication the user is taking or

known allergies or reactions to specific medications could then be appended to the search request without the searcher having to explicitly include such information. This enables the user to receive information back which has already taken into account if they react say to a known drug which might otherwise be very suitable for treating hayfever. Similarly, if the user searches for "hayfever treatment for Joe", the proxy server may use the user's identity to perform a look up for records and determine that an identifier for "Joe" may be required, and ask the searcher to provide an authorisation code before this is incorporated into the search request. Should the user not have authority to include additional information relating to "Joe" the search results returned may indicate that no specific information for Joe was provided, only generic information. In neither case, however, does the user need to know exactly what information is provided.

Alternatively, instead of the context of the search result being recognised and the appropriate additional information appended, the additional information conveyed may be requested by one or more of the data sources which receive the search request which are capable of incorporating the additional information in their response. This may be more appropriate if information is highly sensitive, in which case, for example, the additional information may only be conveyed to secure sites.

One embodiment of a search method according to the invention will now be described which incorporates permissions and security associations that allow limited access to additional information that would not be freely available under the original search.

In this embodiment, the user is seeking financial information such as a loan. Whilst it is possible to go to a money "supersite" and compare rates on a loan for a specific sum (e.g. £5000), the loans offered would be subject to status checks on the user's credit history etc., and the results of those checks would affect the annual percentage rates (i.e., the interest charged) on the loan.

The search method enables the user's credit history to either be included when the user performs a intelligent search or for a bank or other financial site contacted in the process of a search to request the user's credit history. In neither case does the user have to be aware of their credit history. This means that, for example, the information may be provided from a site holding the user's bank details etc, without the user needing to

access such information or arrange for it to be sent subsequently. The information is instead retrieved from the user's bank data source or from some other intermediary or from a dedicated data bank and provided either to the site requesting the information or to the user's client terminal or proxy server so that it can be appended to the user's search criteria.

The search requests generated by the invention which are sent out by the proxy server in this embodiment of the invention may be targeted towards specific sites associated with the additional information already held for a user, for example targeting the bank credit card companies with which the searcher has an existing account. This may result in more favorable loan interest rates as such institutions may offer existing customers more favorable rates.

The search could also be quite specific and may be based on a template, for example, the user may request a search with important questions relating to loans: option to pay back early, purpose of loan (can it be added to mortgage – does the searcher have a mortgage?) and so forth.

Those skilled in the art will appreciate that the sites from which data related to the search request is retrieved are not able to provide more specific information unless they are aware of the identity of the searcher (or the party for whom the loan is sought in the case where the searcher is not the recipient of the loan). Thus in one embodiment of the invention two different types of information are retrieved. One type of information is generic - i.e., non-specific to any particular entity or individual (in this example on the loan products/services offered). The other type of information is non-generic, i.e. specific, so that if the identity of the subject to which the generic information should relate can be determined by the data source (the same data source providing the generic information - i.e., in this example the identity of the proposed loan recipient) there will be a second, more personalized, level of information which is provided. This requires, for example an appropriate identifier for the entity for which specific information is to be provided to be presented to the data source. The identifier is either included in the search request issued or it is accessible on demand should a site request such information via the SIP server. The invention enables this second type of information, i.e., the personalized information, to be received when a search is performed and the

search criteria or the search sites are able to identify a target recipient of the information or a target recipient to which the information relates.

The advantage of providing personalized information is that it enables the information returned by the search to be presented in a form which enables further action to be taken by the user based on the content of the information returned. For example, if a searcher was to seek out a loan for themselves and received back only information at a generic non-personalised level, should the searcher select a loan they would then need to pass a credit check, this would need to be authenticated by the loan provider, and then the user would need to authenticate they were the recipient of the loan before receiving any money.

The invention enables the user to see and compare real loan information such as the terms and A.P.Rs. and any ancillary benefits or requirements, after they have effectively has the information tailored for their own credit history. Should the confidential information provided on by the loan recipient be considered to be sufficient, all relevant credit-checks may have been performed (for example, if the confidential information provided/requested by a loan site included all relevant financial information required such as bank details, loans, other credit card accounts, saving etc) this means the interest rate and terms offered will reflect the user's credit history and current financial status. The user is then able to take a further action if the information is presented in the right format such as accepting the loan product offered, or purchasing the relevant item (or, for example, some other action such as for a search performed for a medication, the medication may be presented in such a form that it can be purchased or prescribed for a person).

Moreover, should the user select to receive a particular loan, the information provided may remove any need for the user to further authenticate themselves before receiving the money, electronically transferred in a default or designated bank account. This effectively means a user could enter a search criteria "Cheapest loan for £5,000" and in response to the search results then select a loan offered by bank A for three years at an annual percentage rate of 5%, and have the amount electronically transferred to their bank account. Such a seamless banking environment may present risks to the user and various bank institutions may want to impose further checks, however, the invention

enables such a facility to be offered in which a true comparison can be made of the terms each financial institution offers.

Where a search is requested with a view to the information retrieved being specifically related to a third party, the third party will need to provide the searcher with an identifier or access code to enable their personal information to be specifically entered. Such an identifier may be provided with a finite lifetime as a security measure. If the information requested is specific to the searcher, the identifier may be associated with the searcher logging into the search application or by the searcher specifically ensuring their own identifier is contained within the search criteria using some appropriate means.

In one embodiment of the invention, the personalised information provided by the search method enables medical subject matter searches to be performed generally by third parties for patients and for the patients themselves.

Whilst the term "identifier" has been used able, any security mechanism which enables access to the information relevant to the search may be used. For example, to enable the specific information to be accessed, the searcher or SIP server can embed a security mechanism allowing a third party access to information in relation to the search.

In the case of the loan applicant this might be (for example) permission to check his/her credit rating at their bank. This could either be generated by the applicant or by the SIP search engine (which would have a secure relationship with the applicant). The SIP search engine would look generally for good rates (as happens) now, narrow this down using the searchers profile (as would happen with the existing SIP search) and would then apply for a specific rate and terms quotation using the additional security mechanisms to allow third party access (i.e. the loan provider) or to access the information in such a way that it is trusted by the loan provider.

One embodiment of the invention uses digital certificates. In this embodiment, the SIP server sends a credit reference check to the searcher. The searcher digitally signs the credit reference check with a certificate issued by their bank – the SIP server would send the signed request to the bank who would check their records and provide a credit reference (which could be encrypted) and this would be forwarded to the loan provider

who could then check that it had come from the bank and related to the original applicant. This would allow confidential information to pass from the bank to the loan provider without identifying the individual and without the applicant needing to wait for traditional credit clearance.

Figures 7 and 8 of the accompanying drawings show schematically how this embodiment might be implemented and some of the method steps involved respectively.

In Figure 7, an embodiment of the invention is shown in which the SIP search method of the invention is used to retrieve data when the user wishes to perform a search for a loan and to receive back search results which are personally relevant to the user (the searcher).

In Figure 7 user terminal 70 supports first search software module 71 which is arranged to offer an appropriate search interface to a searcher operating user terminal 70. The searcher uses software module 71 to generate a request for information on loans and the cheapest interest rates. In the embodiment shown in Figure 7, the search software module 71 processes the search request and forwards (step A) this on via SIP user agent 72 to the SIP proxy server 74.

The SIP proxy server 74 supports search software module 75 which generates a suitable search based on the search request provided by the SIP client terminal 70. SIP user agent(s) 78 implement the search by seeking to retrieve information over a communications network (not shown) from various data sources (step B).

Data source 67 provides a platform to support the third SIP software module 66 which acts as an interface for the SIP user agent 78 to enable the received message from the proxy SIP server 74 to be processed to determine if information conforming with the user's search request can be provided. Data source 67 ("Loans Company") processes the received search request and response with some generic information, such as their typical loan interest rates (step C) and a request for more specific information in the form of either the identity or credit history or both of the intended loan applicant.

In this embodiment, the receipt of a request for more specific information causes the SIP proxy server 74 to request more information . The SIP Proxy Server then repackages this request and forwards it to either the user (step D) or to a credit reference information source (such as the users bank – if this is known by the server - i.e., proceeding directly to step F).

The user terminal 70 which provides a platform for SIP software module 71 responds to the receipt (step E) of this information request by signing the server's request using the security association already established with the credit reference provider (in this case the bank) using the digital certificate 73 and user's private key (which could be established when the user set up their (on-line) account). The server then requests (step F) the credit information required to support the loan quotes - which the bank then returns (step G).

This information may be encrypted, so that only the end user may unlock it (in which case the server sends it to the user) or it may be encrypted in such a way that only approved financial institutions may unlock it (in which case it is locked with either a general public key, to which the institutions have the private key, or a specific key for the requesting institution.

The server may simply pass on (step H) the information from the bank or it may send it to the user for unlocking (or even unlock the information itself if the user has a strong security association with the SIP server) and perform further processing on the information (not shown). This processing might include the removal of the applicant's identity or irrelevant information. In addition to this processed information (which might be a sub set of the information sent out by the bank) a full version of the bank information is signed and encrypted and included within the information sent to the loan company. The loan company can then send (not shown in Figure 7) the information they have received and the encrypted full version back to the bank which will then verify that the information sent from the user or SIP server had not been tampered with and that it is complete in the areas that are required. The bank can then confirm that the information is correct and relates to the applicant – without the loan company necessarily knowing the applicants name or getting access to more information than was strictly necessary.

The financial body is then able to determine the actual values of certain interest rates, and whether they could in fact offer a specific loan product and any related services and the actual terms of the loan rather than just provide information describing their services and interest rates generically.

The proxy server 74 processes this additional information (for example to check it conforms with the original search criteria of the user and/or any other preferences of the user) before it is provided with any other search results back to the user (step I). The information which is reliant on the credit history and other confidential information may be formatted by the SIP proxy server 74 in such a way that the user can easily accept the terms of the loan offered.

Figure 8 summaries some of the step in the above embodiment. The searcher generates a search request (step 81) which is forwarded via a SIP server to a loan supplier. The loan supplier then offers some general rate information and requests some more specific information (for example the identity and credit history of the intended loan applicant (step 82)). The SIP server then may query the searcher as to the intended loan applicant and assuming this is the searcher, then requests the searcher to digitally sign a request to retrieve the searcher's financial information from their bank account. The user signs the request using the previously generated public/private key pair and associated with the digital certificate (which has been previously issued by their bank) (step 83).

The SIP server then sends the signed request (which includes details required for the loan) to the searcher's bank to provide the necessary information to give to the loan supplier (step 84). The searcher's bank then responds with the information (preferably in an encrypted and signed format) (step 85). This information is then forwarded to the loan supplier who then processes the received information to verify the credit history of the intended loan applicant (step 86). The loan supplier then responds with specific information, for example, to include the terms of the loan they are prepared to offer (or an indication they cannot respond based on the user's credit history) etc (step 88).

Those skilled in the art will appreciate that the principle can be further extended to cover the generic exchange of information related to searching using all kinds of "contingent" and supplementary information that might need to be exchanged by remote parties to assist or enhance a search but requires the authorization/authentication (in its widest sense).

In the case where a search can only return generic information unless access to medical records is provided, for example, if a searcher searches for an insurance product there will be generic information available but specific prices depend on the medical history of the party to be insured. In this case the SIP search engine will need to arrange for the insurance company to access the medical record of the applicant.

The level of access to confidential information may vary according to either the sensitivity of the party and/or the security status of the receiving site. For example, a series of access controls may be implemented and clearance governed by rules according to the nature of the party requesting the confidential information. Examples of different categories for medical health are indicated below. These categories could be automatically created by the body that creates the confidential information, or the SIP server may restrict access or the individual to whom the information relates may restrict access:

- Full access – GP and health service
- Summary – insurance companies, employer (with user consent)
- Data protection summary – individuals (when authenticated)

Each group is able to authorize third parties to access their level of information or to create a sub category for specific purposes (such as getting life cover..) In this case the role of the SIP server is to mediate the information exchange between the parties whilst maintaining privacy and security.

Those skilled in the art will appreciate that notifications of search results may comprise in some instances the entire search result or a reduced data set (for example, just the title and artist of an audio file and not the audio file itself, or a still image of a video). The notification may be delivered electronically by any suitable means and may comprise an

email message, sms message, a telephone call message (generated using suitable voice generation technology) or a multi-media mobile telephone type message.